

SONOBUOY SEISMIC DATA COLLECTED DURING 1982 IN THE BERING SEA

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This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature. Any use of trade names is for descriptive purposes only and does not imply endorsement by the USGS.

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In July-August 1982, the U.S. Geological Survey participated in a government-industry cooperative project for reflection/refraction profiling (GICORP), co-directed by the Center for Marine Crustal Studies, Gulf Oil Corporation. During the cruise (L9-82-BS) aboard the U.S.G.S. research vessel S.P. Lee, 53 seismic sonobuoy profiles, as well as other seismic and geopotential data, were recorded over the Bering Sea continental shelf and abyssal Aleutian basin. This report includes microfilm copies of the sonobuoy seismic monitor records, logsheets, and navigation collected during the cruise. Sonobuoy data have also been recorded on magnetic tape.

The seismic sonobuoy data from the Bering Sea (Figure 1) were recorded using a 5-airgun source array with air displacement that varied from 1311 to 2300 in³ (Table 1). Two types of sonobuoys were used, military (U.S. Navy-type 41B) and commercial (Ref Tek 1-type 176 mhz). Detailed procedures for the shipboard recording and display of the sonobuoy data are described in Childs and Cooper (1978). Briefly, the sonobuoys were deployed with hydrophone depths of 60-65 feet and were recorded on ship on both analog magnetic tape and paper monitor records. Data displayed on the monitor records were read from the analog magnetic tapes, rather than directly from the sonobuoy receiver, to verify that good sonobuoy data were being recorded on the magnetic tape. Later, the sonobuoy tapes were replayed with variable bandpass filter settings and different vertical time scales to produce additional paper monitor records. The microfilm includes two monitor records for each sonobuoy profile, a 10-second record that was generated during the actual sonobuoy run (useful for reflection/refraction velocity determinations) and a 32-second record that was replayed from the magnetic tape (useful for monitoring the direct arrival and refraction arrivals). For two sonobuoy stations (242 and 243), the same procedures were followed and sonobuoy data were also recorded digitally on a shipboard multichannel seismic recording system.

Shipboard navigation was done by computer with inputs from TRANSIT satellite, Loran C-hyperbolic, Loran C-rho rho, gyro, and a water speed indicator. Firing of the airgun array was controlled by the navigation system and was done on either a time basis (17 to 22 seconds) or a distance basis (50m or 100m). Multichannel seismic-reflection, high resolution seismic-reflection, gravity, magnetic, and bathymetry data were recorded simultaneously with the sonobuoy seismic data.

Two points concerning the sonobuoy operations are noteworthy:

1. Sonobuoys recorded in the St. George Basin (buoys 192 to 197), Bristol Basin (buoys 198 to 205), and Navarin Basin (buoys 225-228 and 233-241) areas often have high seismic noise levels caused by other seismic boats operating nearby. Consequently, the data in these areas are degraded and reflectors/refractors are more difficult to identify.
2. On many sonobuoy profiles, especially those recorded in very shallow water (25-40 m), the direct arrival (ship to buoy through the water) is noticeably curved, rather than being straight, at large offsets (20-40 km). Because the direct arrival is curved and the refraction arrival at similar offsets is usually not curved, ship speed changes or buoy drift do not appear to be the explanation for the curved direct arrival. The explanation is unclear but may be related to velocity variations in the water column along the sonobuoy profile. Surface-water temperatures have been measured for each sonobuoy (see logsheets), however these temperatures are uniform and do not suggest variations in the surface-water velocity.

Seismic sonobuoy data from the GICORP project are slated for digital processing at the Center for Marine Crustal Studies, Gulf Oil Corporation. Analog magnetic tapes will be converted to digital tapes and processing done from the digital tapes. Full size copies of seismic sonobuoy monitor records are available for inspection at USGS, 3475 Deer Creek Road, Rm B112, Palo Alto, California. For information concerning the inspection of these records and the availability of the analog and digital (available when converted) tapes contact:

Dr. Alan Cooper
U.S. Geological Survey, MS 99
345 Middlefield Road
Menlo Park, Ca. 94040
415-856-7094

Copies of the microfilm data and digital navigation data are available from:

Dr. Michael Loughridge
Chief, Marine Geology and Geophysics Division
National Geophysical and Solar-Terrestrial Data Center
NOAA/EDIS/NGSDC, Code D64
325 Broadway
Boulder, Colorado 80303
303-497-6338

REFERENCES:

Childs, J.R., and Cooper, A.K., 1978, Collection, reduction, and interpretation of marine seismic sonobuoy data, U.S. Geol. Survey Open-File Report 78-442, 219 p.

Table 1: Sonobuoy Information

Sonobuoy No.	Line	Shot Point	Water Depth (m)	Time JD Hour	Latitude	Longitude	Sono Type	Source (in3)
191	START	515	731	193 1842.0	54 20.51	-166 59.21	R	1311
191	END	1352	504	193 23 6.0	54 28.60	-166 22.69		
192	START	427	292	194 129.0	54 41.23	-166 10.08	R	1311
192	END	1340		194 548.0	55 2.76	-165 53.93		
194	START	1560	124	194 650.0	55 8.35	-165 49.74	M	1311
194	END	2435		194 1058.0	55 29.12	-165 31.10		
195	START	2808	110	194 1249.1	55 37.93	-165 22.73	M	1311
195	END	3535		194 1633.1	55 55.35	-165 10.52		
196	START	3692	95	194 1722.0	55 59.33	-165 7.64	M	1311
196	END	4729		194 2240.0	56 27.14	-164 47.02		
197	START	4808	77	194 23 4.1	56 29.21	-164 45.49	M	1311
197	END	5788	70	195 350.0	56 52.38	-164 28.52		
198	START	119	70	195 5 3.1	56 52.96	-164 18.56	M	1311
198	END	1140	74	195 1010.1	56 41.50	-163 32.57		
199	START	1193	74	195 1026.1	56 40.88	-163 30.12	M	1311
199	END	2107		195 15 5.1	56 30.42	-162 50.26		
200	START	2148	75	195 1517.0	56 29.95	-162 48.64	R	1311
200	END	2926		195 1926.0	56 21.41	-162 16.34		
201	START	3038	40	195 1945.0	56 20.78	-162 13.86	M	1311
201	END	4280	40	196 158.0	56 7.32	-161 24.87		
202	START	208	42	196 4 3.0	56 12.29	-161 14.10	M	1311
202	END	1067	69	196 835.0	56 35.01	-161 5.40		
203	START	1276	67	196 940.0	56 40.49	-161 3.19	M	1311
203	END	2153	59	196 1351.0	57 3.51	-160 53.91		
204	START	2177	59	196 1359.0	57 4.22	-160 53.62	R	1311
204	END	3110	60	196 19 0.0	57 28.66	-160 43.57		
205	START	3257	59	196 1953.0	57 32.55	-160 41.98	R	1311
205	END	4269	50	197 211.0	57 59.13	-160 30.15		
206	START	475	41	197 4 9.0	58 3.89	-160 41.79	R	2300
206	END	2465	44	197 932.0	58 13.20	-161 23.64		
207	START	2513	38	197 949.0	58 13.71	-161 25.85	R	2000
207	END	3406		197 1530.0	58 22.84	-162 7.95		
208	START	3458	46	197 1553.0	58 23.40	-162 10.57	R	2100
208	END	4580		197 2220.0	58 34.81	-163 3.77		
209	START	4607	25	197 2230.0	58 35.07	-163 5.13	R	2100
209	END	5403	30	198 331.0	58 42.80	-163 43.36		
210	START	5463	29	198 352.0	58 43.37	-163 46.31		
210	END	6543	27	198 10 0.0	58 54.35	-164 38.05		

Sonobuoy No.	Line	Shot Point	Water Depth (m)	Time JD Hour	Latitude	Longitude	Sono Type	Source (in3)
211	START	6593	27	198 1017.0	58 54.82	-166 40.36	R	2100
211	END	7590	25	198 1632.0	59 4.51	-165 28.28	R	2130
212	START	7704	25	198 1714.0	59 5.76	-165 34.29	R	2130
213	START	8132	23	198 1926.0	59 9.94	-165 55.10	M	1900
212	END	8824		198 23 6.0	59 16.60	-166 28.93		
213	END	9163	26	199 115.0	59 19.68	-166 45.77		
214	START	9261	27	199 2 3.0	59 20.84	-166 52.22	R	2100
214	END	10230	31	199 751.0	59 29.99	-167 41.73		
215	START	161	25	200 2231.0	60 21.60	-167 22.10	M	1800
215	END	420	26	200 55.0	60 21.53	-167 26.27		
216	START	340	25	200 23 1.0	60 21.51	-167 27.27	M	1800
216	END	1139	30	201 432.0	60 19.75	-168 15.87		
217	START	1210	31	201 457.0	60 19.62	-168 19.85	R	2100
217	END	1987	39	201 930.0	60 17.02	-169 7.76		
218	START	2328	41	201 1010.0	60 16.76	-169 15.35	M	2130
218	END	3328	54	201 15 0.0	60 15.50	-170 8.82		
219	START	127	50	202 7 7.0	60 16.06	-169 53.12	R	2130
219	END	1123	64	202 1255.0	60 13.40	-170 47.31		
220	START	1199	64	202 1322.0	60 13.15	-170 51.84	M	2100
220	END	2134	62	202 1830.0	60 10.05	-171 42.51		
221	START	2168	61	202 1840.0	60 9.94	-171 44.17	M	1900
221	END	3262	58	203 043.0	60 5.84	-172 42.30		
222	START	127	58	203 142.0	60 6.73	-172 51.43	M	1900
223	START	1292	87	203 9 8.0	60 14.30	-173 52.64	R	1900
222	END	1450		203 10 0.0	60 15.21	-174 0.91		
223	END	2329		203 1119.0	60 16.82	-174 14.00		
224	START	1717	97	203 1125.0	60 16.94	-174 15.00	M	1900
224	END	2329		203 1440.0	60 20.78	-174 47.60		
225	START	296	106	203 1625.0	60 19.38	-175 4.36	M	1700
225	END	5620		203 2035.0	60 14.90	-175 45.40		
726	START	1570	128	203 2311.0	60 11.85	-176 11.28	M	1311
226	END	2412		204 346.0	60 7.38	-176 58.68		
227	START	2453	135	204 358.0	60 7.10	-177 0.83	M	1311
227	END	3657	142	204 10 0.0	60 0.59	-178 1.52		
228	START	3888	139	204 1110.0	59 59.37	-178 13.23	M	1311
228	END	4180		204 1240.0	59 57.65	-178 29.50		
229	START	5401	2670	204 19 7.0	59 50.20	-179 33.26	M	1311
230	START	5886	2850	204 2222.0	59 47.16	-179 57.75	R	1311

Sonobuoy No.	Line	Shot Point	Water Depth (m)	Time JD Hour	Latitude	Longitude	Sono Type	Source (in 3)
229	END	6160		204 2359.0	59 45.37	179 47.75	R	1311
230	END	7043		205 445.0	59 40.16	179 2.23		
231	START	50	3555	205 10 3.0	59 35.34	178 33.69	M	1311
231	END	1132		205 1618.0	59 53.06	179 19.50		
232	START	1631	2598	205 1631.0	59 53.70	179 21.20	M	1311
232	END	2112		205 2131.0	60 8.81	-179 58.25		
233	START	3571	281	206 5 8.0	60 32.00	-178 53.58	M	1311
233	END	4727	152	206 1048.0	60 49.86	-178 2.14		
234	START	5200	136	206 1311.0	60 57.12	-177 40.67	R	1311
234	END	5988	122	206 1726.0	61 9.10	-177 4.64		
235	START	6278	116	206 19 0.0	61 13.37	-176 51.13	M	1311
235	END	7300		207 026.0	61 28.58	-176 3.26		
236	START	7370	98	207 048.0	61 29.56	-176 0.02	M	1311
236	END	8223		207 525.0	61 41.99	-175 19.53		
237	START	43	80	207 821.0	61 42.06	-175 16.81	M	1311
237	END	1291		207 1440.0	61 40.04	-176 27.26		
238	START	247	100	207 21 9.0	61 30.67	-177 23.07	R	1700
238	END	1275		208 238.0	61 3.58	-177 14.51		
239	START	47	139	208 1227.0	60 15.45	-177 27.67	M	1700
240	START	550	137	208 1511.0	60 4.57	-177 11.81	R	1700
239	END	1142	136	208 1831.0	59 51.73	-176 52.74		
241	START	1153	136	208 1834.0	59 51.55	-176 52.44	H	1400
240	END	1805	136	208 22 7.0	59 39.07	-176 33.02		
241	END	2234	135	209 1 0.0	59 28.43	-176 17.60		
242	START	43	152	213 545.0	58 37.94	-176 10.90	M,R	2000
242	END	590	142	213 11 0.0	58 38.99	-177 8.50		
243	START	42	142	213 1112.0	58 39.32	-177 10.68	R	2000
243	END	499		213 1530.0	58 52.11	-177 51.60		

M = Military sonobuoy - U.S. Navy type 41B

R = Commercial sonobuoy - REF TEK 1

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